SemiCDNet: A Semisupervised Convolutional Neural Network for Change Detection in High Resolution Remote-Sensing Images

Year: 2020 | Citations: 323 | Authors: Daifeng Peng, L. Bruzzone, Yongjun Zhang, H. Guan, H. Ding

Abstract

Change detection (CD) is one of the main applications of remote sensing. With the increasing popularity of deep learning, most recent developments of CD methods have introduced the use of deep learning techniques to increase the accuracy and automation level over traditional methods. However, when using supervised CD methods, a large amount of labeled data is needed to train deep convolutional networks with millions of parameters. These labeled data are difficult to acquire for CD tasks. To address this limitation, a novel semisupervised convolutional network for CD (SemiCDNet) is proposed based on a generative adversarial network (GAN). First, both the labeled data and unlabeled data are input into the segmentation network to produce initial predictions and entropy maps. Then, to exploit the potential of unlabeled data, two discriminators are adopted to enforce the feature distribution consistency of segmentation maps and entropy maps between the labeled and unlabeled data. During the competitive training, the generator is continuously regularized by utilizing the unlabeled information, thus improving its generalization capability. The effectiveness and reliability of our proposed method are verified on two high-resolution remote sensing data sets. Extensive experimental results demonstrate the superiority of the proposed method against other state-of-the-art approaches.